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ESPRIT II T.M.

VIDEO DISPLAY TERMINAL
REFERENCE MANUAL

HI-1109 REV. B
JUNE 1983

WARNING

This equipment generates and uses radio frequency energy and if not installed and used properly, (i.e., in strict accordance with the instruction manual) may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

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Section I

INTRODUCTION AND DESCRIPTION

1.1 INTRODUCTION

The ESI Esprit II Video Display Terminal combines large-scale integrated circuit and microprocessor technologies to provide maximum performance in an economy terminal with the following capabilities:

- As an interactive terminal it is compatible with the original Esprit and Hazeltine 1500 terminals, and can display foreground data as high-intensity, and/or underlined, and/or reverse video.
- As a buffered (editing) terminal it permits insert and delete character operation, and use of protected and unprotected fields with transmission by field, line, or page.
- It can be set up to emulate an ADM-3A[1] or Regent 25[2] terminal.
- The auxiliary I/O port permits two way communication with a peripheral device on-line, or off-line print.
- It can act as a line monitor, displaying all 128 ASCII characters including control codes.

This manual describes the features and characteristics of the Esprit II Video Display Terminal:

- Installation, setup and turn-on instructions are in Section II.
- Data for operators, describing keyboard functions and modes of operation is in Section III.
- Data for programmers, describing the many remote commands is in Section IV.
- Interface details for installation planning are in Section V.

Technical assistance or additional information may be obtained from:

ESPRIT SYSTEMS INC.
100 Marcus Drive
Melville, NY 11747

1.2 DESCRIPTION

The Esprit II terminal includes a dual intensity, high resolution CRT video monitor, a detached keyboard with its own microprocessor to scan the keys, and two serial input/output ports. The technical characteristics of the terminal are summarized in Table 1-1.

[1]Trademark of Lear-Siegler Corp.
[2]Trademark of Applied Digital Data Systems

Table 1-1. Technical Characteristics (Sheet 1 of 2)

DISPLAY FORMAT	
Screen	12 inch (305 mm) or 15 inch (380 mm) diagonal, PC146 (green) phosphor, raster scan
Capacity	80 characters/line × 24 lines (1920 characters)
Character Format	7 × 9 dot matrix in 9 × 12 window, dual intensity. Character shows through cursor in reverse video when superimposed.
Cursor	Block or underline; steady, slow or fast blink (keyboard selectable)
Character Set	95 displayable ASCII, all 128 ASCII characters can be displayed in monitor mode
Refresh Rate	60 Hz or 50 Hz, no interlace
TV Line Standard	307 lines/frame (60 Hz) or 369 lines/frame (50 Hz) 288 lines displayed
Memory	2048 × 8 Random Access Memory
INTERFACE	
Input/Output	EIA Standard RS 232 or 20 mA current loop at 50, 75, 110, 135, 150, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600 or 19,200 baud, switch selectable
Auxiliary I/O	RS 232 with keyboard or remote output enable/disable
Parity	Odd, Even, One (Mark), or Zero (Space), switch selectable
Character	10 or 11 bit (start bit, 7 bit ASCII, parity, minimum of 2 stop bits at 50, 75, and 110 baud, 1 at all other rates)
Modes	Half or full duplex, interactive or batch
PHYSICAL/ENVIRONMENTAL DATA	
Dimensions	Console: 14.5" (368 mm) H, 17.3" (440 mm) W, 14" (355 mm) D, 28 lbs (12.5 kg) Keyboard: 2.6" (66 mm) H, 17.3" (440 mm) W, 7" (180 mm) D, 3.2 lbs (1.4 kg)
Power	115 or 230 V, 50 or 60 Hz, 40 watts (136 btu/hr)

Table 1-1. Technical Characteristics (Sheet 2 of 2)

Environment	Operating: 10° to 40° C (50° to 104° F), humidity 5% to 95% non-condensing. Storage: 0° to 65° C (32° to 150° F)
ADDITIONAL FEATURES	
Keyboard	Detached typamatic keyboard with 14 key numeric pad. Key click selected or cancelled from keyboard.
Self Test	Automatic self test at turn-on with specific fault indications plus keyboard entered memory test.

Section II

INSTALLATION, SETUP AND TURN-ON

2.1 INSTALLATION

2.1.1 Voltage Setting. After unpacking the terminal, check that it is set for the proper mains voltage. A slide switch on the bottom of the display console selects either 115 or 230 volt operation. To change the selection, remove the screw holding the security link, change the switch setting, and replace the security link on the other side of the switch.

The terminal is normally shipped with a U.S. standard 115v A.C. power plug. For other power sources this may have to be changed. If so, replace the plug with an "Eagle" type 6-15P plug or equivalent Underwriters Laboratory listed device. The brown wire is the "hot" lead and the blue wire is neutral. **Make sure the green lead is securely connected to the ground terminal of the new plug.** This may already have been done by your dealer or distributor.

2.1.2 Keyboard Connection. To connect the keyboard to the display console, orient the connector so that the small tab is toward the front of the terminal, and press the connector into the mating jack at the bottom right side (figure 2-1) until it latches in place.

2.1.3 Input/Output Connections. The two EIA standard RS 232 serial I/O connectors are located at the rear of the terminal. Connect the host computer, directly or through a data set, to the "EIA/CL" connector. A serial peripheral device, such as a printer, may be connected to the "AUX EIA" connector.

Interface details are provided in Section V.

2.2 SETUP

Two banks of ten switches at the rear of the terminal (figure 2-2) are used to select communications, operation and display options. Extra copies of figure 2-2 are included at the rear of this manual. It is recommended that normal switch settings be noted and a copy kept near the terminal.

Bank 1 switches 1 and 2 enable or disable **current loop** for received and transmitted data respectively.

Switches 3 through 6 select one of 15 **baud rates**.

Switch 7 is set to select ~ or ESCape as the **lead-in character** for Hazeltine mode only. If ESC is selected, ~ (tilde) is a displayable character; if ~ is selected it will not display.

Switch 8 selects **half or full duplex** communication.

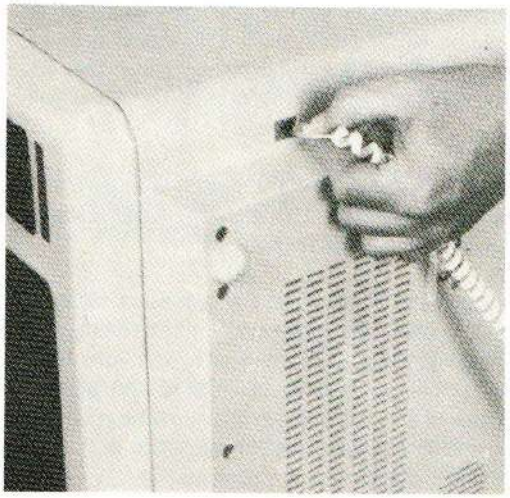


Figure 2-1. Keyboard Connection

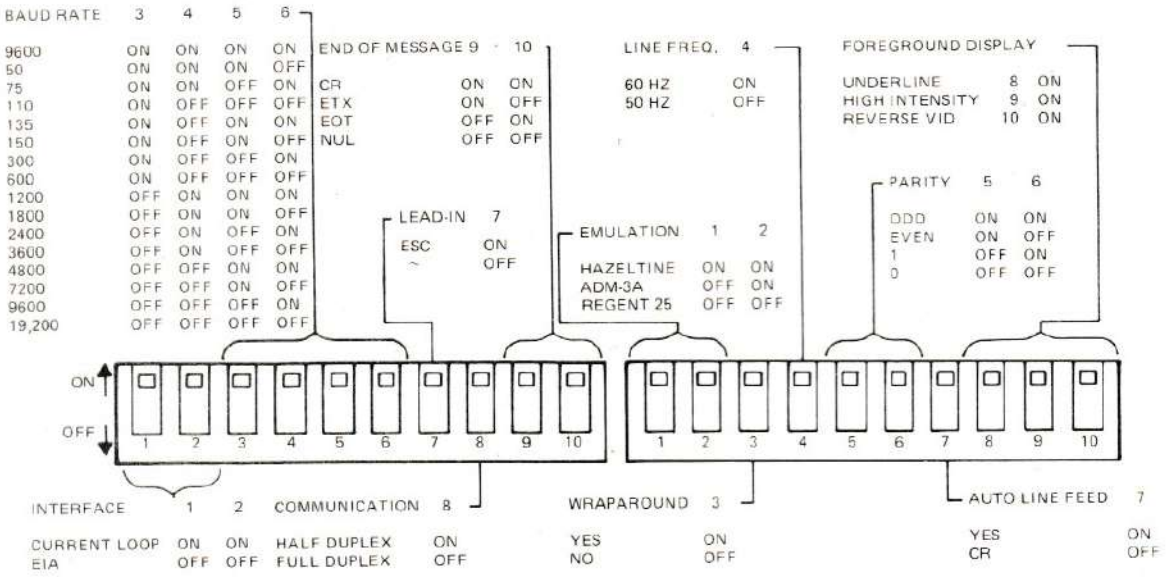


Figure 2-2. Switch Selections at Rear of Terminal

The **"end of message" character** selected by switches 9 and 10 (Carriage Return, End of Text, End of Transmission, or Null) will be transmitted (followed by a null) after any batch transmission, and after any terminal reply to a remote command (Send Cursor Address or Send Character at Cursor). In half duplex operation, a null will be transmitted after the selected character and Request to Send will drop.

Bank 2 switches 1 and 2 select one of three **emulation** modes: Hazeltine, Lear-Siegler ADM-3A, or ADDS Regent 25.

If switch 3 is on, the cursor will automatically **wrap around** from the last column of the display to the first column of the next line (Auto New Line). If the switch is off, when the cursor reaches the 80th column it will remain there, overwriting old data with new, until a cursor movement command is received.

Switch 4 selects the display **refresh rate** and should normally be ON (60 Hz). If the power line frequency is 50 Hz, and the display appears wavy, a better display may be obtained by setting the switch off (50 Hz refresh). Enter SBREAK to activate the change if the switch setting is changed with power on.

Switches 5 and 6 select one of four **parity** options for both transmitted and received data. If odd or even is selected, the terminal will check received data for parity and display ? if an error is detected. No parity check is made if 1 or 0 is selected.

If switch 7 is on, the terminal will perform a **Carriage Return and Line Feed** for each CR received or entered and will ignore Line Feeds. A CR will be inserted after each row during a Local Print. If the switch is off, each CR will cause the cursor to move to the start of the present row and each LF will cause it to move down one row. A CR and LF will be inserted after each row during a Local Print. If the display is consistently double spaced, this switch should be set to OFF as the computer is taking care of auto line feed.

Switches 8, 9 and 10 cause **foreground data** to be displayed as underlined in high intensity and reverse video respectively, and any combination may be used. They are effective only in the Hazeltine emulation mode (all data is low intensity in other modes).

2.3 TURN-ON AND SELF TEST

a. Place the terminal in the desired work area. Insure that air can circulate freely around the rear, base and top of the display console.

b. Plug the power cord into a properly grounded outlet. Do not use adapters that prevent the terminal from being properly grounded or a shock hazard may result.

c. Set the power switch at the rear of the terminal to ON. The terminal should sound a short beep and the red LED on the keyboard should come on. The terminal will automatically perform a self test at this point. After a brief warmup, the steady block cursor should appear at the home position and the screen should be clear with no error message. If the display fails to come on or an error message is displayed, set the power switch to off, wait 30 seconds, and set the power switch to ON again. If the fault recurs, the terminal is defective (refer to Table 2-1 for the meaning of the error messages).

2.4 USER MAINTENANCE

WARNING

Repair or adjustment of internal components should be performed only by a qualified technician.

Dangerous voltages (13,500 VDC, 600 VDC, and 100 to 240 VAC) are present in the terminal. Some voltage may remain present after power is disconnected.

The internal phosphor coating on the cathode ray tube is toxic; if skin or eyes are exposed to phosphor due to a broken tube, rinse with water immediately and consult a physician.

2.4.1 Troubleshooting. If the unit fails to turn on (beep does not sound and red LED on keyboard does not light) check the following:

- Power cord connected to a working outlet and power switch on
- Fuse not blown

The fuse holder is at the bottom rear of the terminal. Use only a 1.5 A, 250 V type 3AG fuse. Use of a higher rated fuse may cause damage to the terminal.

If the unit comes on with no error message but fails to operate properly, check the following:

- Connectors at rear of terminal are tight
- DIP switches at rear of terminal are set properly for the system
- CONTRAST control at rear of terminal is set properly
- If possible, substitute another terminal to insure that the problem is not in the interface

Table 2-1. Self Test Error Messages

Error Character Displayed															Fault Detected
1	2	3	4	5	6	7	8	9	:	;	<	=	>	?	
*		*		*		*		*		*		*		*	Display Memory
	*	*			*	*			*	*			*	*	Scratchpad
			*	*	*	*					*	*	*	*	Program ROM
							*	*	*	*	*	*	*	*	Keyboard

2.4.2 Cleaning. The exterior of the terminal may be cleaned by wiping it with a damp cloth. The CRT face may be cleaned with a household glass cleaner.

Section III

OPERATION

3.1 MODES OF OPERATION

3.1.1 Introduction. The Esprit II terminal has three modes of operation which apply to all three emulations and two which apply only to Hazeltine emulation. The three are:

Normal (Interactive) in which keyboard data is transmitted when entered, and in half duplex, is displayed if character data and performed if a command. In full duplex, only received or echoed data is displayed or acted upon. Received control characters are ignored except for valid remote commands.

In normal mode the emulation selected by DIP switch determines the characteristics of the terminal. When Hazeltine emulation is selected, it is basically an emulation of Hazeltine 1500 operation. Foreground data is displayed as selected by DIP switch Bank 2 switches 8, 9 and 10 (paragraph 2.2). When ADM-3A or Regent 25 emulation is selected, all data is displayed as low intensity and the remote command set for the selected terminal applies.

Monitor (Transparent) in which all characters, including control codes, are displayed. Control characters display as a two character mnemonic in a single character window (Appendix A). The only function which is executed is a Carriage Return, which is both displayed and performed. Note that since Line Feeds are not performed, Auto Line Feed must be selected by DIP switch to use this mode. It may also be necessary to select Auto New Line (wrap-around) to prevent data from overrunning the line length.

Local mode in which received data is ignored and keyboard data is displayed but not transmitted. Local may be Normal (commands executed and control characters ignored) or Monitor (control characters displayed as described above).

The two modes applicable to Hazeltine only are:

Block/Page in which keyboard data is stored, but not transmitted until the ENTER key is depressed with or without SHIFT. ENTER causes all foreground data on the display to be transmitted. SHIFT/ENTER causes all data in the foreground field the cursor is in, to be transmitted.

This is a partial emulation of the Hazeltine 1510/1520 "Format" mode.

Line is a special case of block mode in which keyboard data is stored, and all foreground data on the line the cursor is on, is transmitted when either RETURN or ENTER is depressed. This is a partial emulation of the Hazeltine 1510/1520 "Format/Line Transmit" mode.

If one of the "Keypad Function Modes" described in paragraph 4.6 is used, the numeric pad keys become an exception. A special sequence is transmitted immediately and not displayed even though the terminal is in Block/Page or Line mode.

As shown in figure 3-1, there are limitations on changing operating modes. Local may be entered from Normal or Monitor modes and will retain the characteristic (display control codes or not) but there is no Local/Block mode. Block/Page mode can only be entered when Hazeltine emulation is selected and Line mode can only be entered if the terminal is already in Block/Page mode. The remote "Reset Block Mode" command or "BLOCK" keyboard entry will return the terminal to Normal (Interactive) mode from either Block/Page or Line mode.

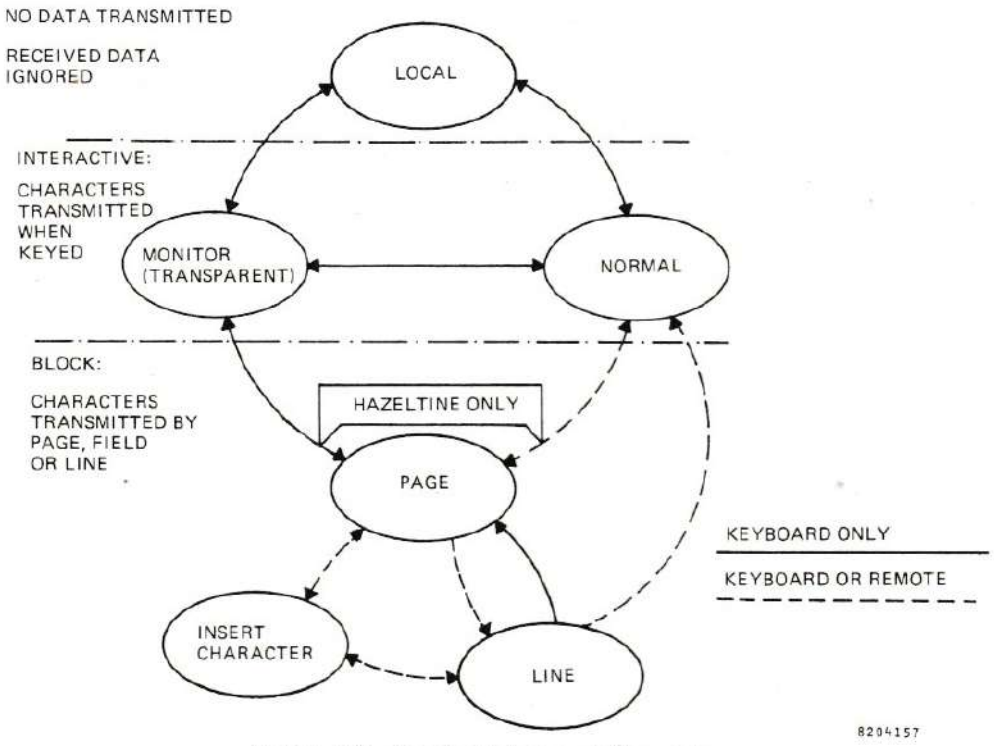


Figure 3-1. Terminal Modes of Operation

3.1.2 Foreground/Background. All data on the display (including blank spaces) is classified as foreground fields or background fields.

Foreground	Background
Cleared by FGD CLEAR key or remote command	Not cleared by keyboard or remote FGD CLEAR
Tabbed "to" by field tab	Tabbed "over" by field tab
Unprotected (can be overwritten from keyboard)	Protected (except in Normal mode)
Transmitted when batch transmission is initiated	Not transmitted when batch transmission is initiated.

A "field" is any contiguous group of foreground data or background data. At turn-on or after a "clear screen", the display consists of one field of foreground spaces.

The foreground characters may be displayed in high intensity and/or underlined and/or reverse video as selected by switches (paragraph 2.2). Background characters are always low intensity. The terminal fills display with foreground spaces and defaults to the background follows state at turn on.

3.2 KEYBOARD (Figure 3-2)

3.2.1 Keyboard Commands. Several features of the terminal are selected or disabled by keyboard entries as follows:

NOTE

A superscript ^{C} or ^{S} is used throughout this manual to indicate holding the CTRL and/or SHIFT key down while making an entry.

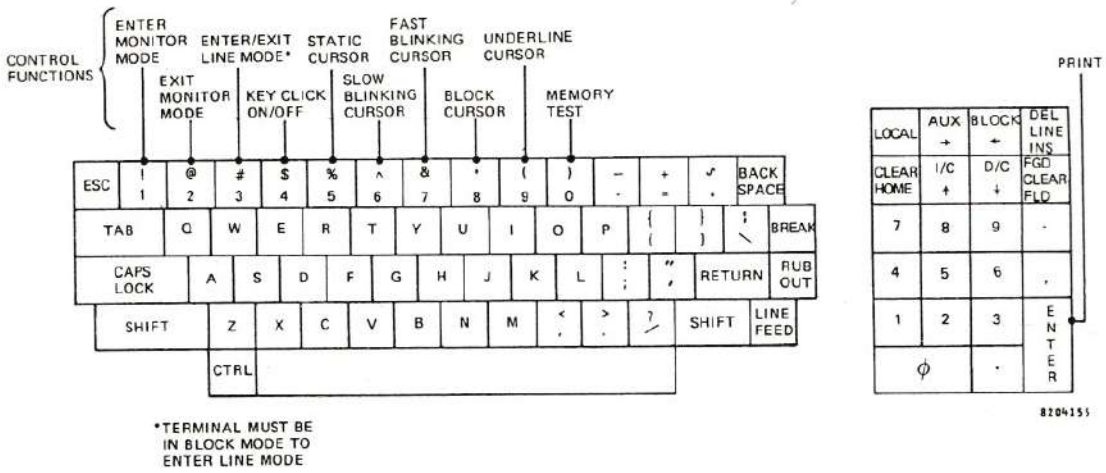


Figure 3-2. Keyboard

SBLOCK places the terminal in Block/Page mode (functions only in Hazeltine emulation). A second SBLOCK entry returns the terminal to Normal mode from either Block/Page or Line mode.

SAUX alternately disables and enables output at the auxiliary port (output is enabled at turn-on). When output is enabled, all data received by or echoed back to the terminal is automatically output at the auxiliary port, and in half duplex operation, data transmitted by the terminal is output to the auxiliary device.

SLOCAL will alternately enable and disable Local mode (does not function in Block mode). While in this mode, communication with the host computer is cut off. All received data is ignored by the terminal. Keyboard entered data is displayed but not transmitted.

SI/C alternately enables and disables insert character operation (functions only in Block mode). While enabled, all new data is inserted at the cursor location. The character already at that location, and all characters to the right, to the end of the foreground field or end of line, whichever comes first, move to the right. The keystroke will be ignored (alarm sounds) if the cursor is in a background (protected) field. A second SI/C entry restores normal operation.

NOTE

Each of the four preceding keystrokes will be acknowledged by an audible indication. One beep will sound when Block or Local mode is entered or Aux output or insert character operation is enabled. Two beeps will sound when a mode is canceled or a function disabled. Nothing is transmitted as a result of these keystrokes in either half or full duplex operation.

SD/C (Delete Character) functions only in Block mode. The character at the cursor location is deleted and all characters to the right, to the end of the foreground field or end of line, whichever comes first, move left one column. The alarm will sound if an attempt is made to delete a character in a background (protected) field.

SBREAK causes the terminal to transmit a break signal (all zeros for approximately 1/4 second).

CAPS LOCK is an alternate action switch which alternately locks down and up. When in effect (down), all alphabet keys generate upper case characters without requiring depression

of the SHIFT key. Unlike a typewriter "Shift Lock", this key has no effect on keys other than A to Z.

3.2.2 Keyboard Controls. There are eleven functions controlled from the keyboard by use of keys depressed with the CTRL key (figure 3-2). These functions apply in all emulation modes:

- $^{C}1$ Enter Monitor mode (does not function in Block mode)
- $^{C}2$ Exit from Monitor mode
- $^{C}3$ Enter or exit Line mode (alternate action) (must be in Block mode)
- $^{C}4$ Enable/Disable key click
- $^{C}5$ Select static cursor
- $^{C}6$ Select slow blinking cursor
- $^{C}7$ Select fast blinking cursor
- $^{C}8$ Select block cursor
- $^{C}9$ Select underline cursor
- $^{C}0$ Display memory test (does not function in Block mode)
- ^{C}ENTER Local Print

The display memory test will alternately fill display memory with background U's and foreground *'s. These codes are complements and result in writing both 0 and 1 in every bit location.

Local Print causes all data from the home position to the cursor location to be output at the auxiliary port. This command is invalid if the auxiliary port is already on-line.

The keys discussed above are not affected by the communications mode (half or full duplex). Other keys function differently depending on communication mode and/or terminal mode of operation and are discussed in the following paragraphs.

3.2.3 Interactive Mode. In this mode all alpha, numeric, and symbol keystrokes cause the terminal to transmit the corresponding character. In full duplex the character will be displayed when echoed, in half duplex it is displayed when keyed. The ESC key causes an escape code to be transmitted and the RUB OUT key causes a DEL character to be transmitted; nothing is displayed in either case.

The numeric pad keys normally duplicate the functions of the corresponding keys in the alphanumeric pad, with ENTER duplicating the RETURN key. If one of the "Keypad Function Modes" described in paragraph 4.6 is in effect, the numeric pad keys function as described therein.

The cursor movement and clear keystrokes in full duplex cause codes to be transmitted which will cause the corresponding action when echoed, permitting the host computer to keep track of the display status. In half duplex the corresponding action is performed when keyed; some keystrokes cause characters to be transmitted, others do not.

Table 3-1 lists the codes transmitted and actions performed for cursor movement and clear keystrokes, in both half and full duplex, for Hazeltine emulation only. For other emulations, the FGD/CLEAR/FLD and INS/LINE/DEL keys do nothing, and the CLEAR and cursor movement keys function as on the terminal being emulated except as noted in paragraph 3.3.

3.2.4 Block Mode. The terminal is placed in Block mode by the ^{S}BLOCK keystroke (one beep will sound) or by remote command. The essential differences between Block and Normal modes are:

- Keyboard entries are stored in display memory for later transmission. Data can be written over or cleared and reentered, and characters inserted or deleted before transmission.

- **Background** fields are **protected** against keyboard entries, insertion or deletion, and are **not transmitted**. Insert/Delete Line keystrokes do not function (they could delete protected fields).

The first characteristic is most useful in editing applications. The second characteristic is most useful in form fill applications. A form can be displayed on the screen with the definitions in background, and with foreground spaces for the entry areas. Entries can then be made in the foreground areas, using the TAB key to move the cursor to the start of each new entry area. The data entered can then be transmitted without the background data. After transmission a SFGD/CLEAR, or remote command will clear the data entered, leaving the background for further use.

When Block mode is enabled, transmission is by field or page, unless the terminal is subsequently placed in Line mode as described below. The ENTER key will cause all foreground data on the display to be transmitted regardless of the cursor location. The cursor will be placed in

Table 3-1. Interactive Mode Cursor Movement and Clear Operations (Hazeltine Only)

KEYSTROKE	ACTION	HALF DUPLEX CHAR(S) SENT	FULL DUPLEX CHAR(S) SENT
TAB	Tab to first column of next foreground field	HT	HT
STAB	Back tab to first column of field cursor is in or previous foreground field	LI[2] DC4	LI DC4
BACKSPACE ←	Cursor left Cursor left	BS None	BS BS
SBACKSPACE →	Cursor right Cursor right	DLE None	DLE DLE
LINE FEED ↓	Cursor down or none[1] Cursor down	LF None	LF LI VT
SLINE FEED or ↑	Cursor up	None	LI FF
RETURN or ENTER	Carriage return or carriage return and line feed[1]	CR	CR
HOME	Homes cursor	None	LI DC2
SCLEAR	Clears screen	None	LI FS
CLEAR FLD	Clears the foreground field the cursor is in	None	LI SYN
SFGD CLEAR	Clears all foreground data	None	LI GS

Table 3-1. Interactive Mode Cursor Movement and Clear Operations (Hazeltine Only) (Sheet 2 of 2)

KEYSTROKE	ACTION	HALF DUPLEX CHAR(S) SENT	FULL DUPLEX CHAR(S) SENT
^{C}FGD CLEAR FLD	Clears to end of line	None	LI SI
^{CS}FGD CLEAR FLD	Clears to end of screen	None	LI CAN
LINE INS	Insert line	None	LI SUB
^{S}DEL LINE	Delete line	None	LI DC3

[1] Action depends on auto line feed switch selection (paragraph 2.2)

[2] LI = ESC or ~ depending on switch selection (paragraph 2.2)

the first foreground location on the display. ^{S}ENTER will cause all data in the foreground field the cursor is in to be transmitted. Each transmission is followed by the selected end-of-message character and a null. No rollup will occur as a result of page or field transmission.

There are two exceptions to the rule that keyboard data is stored for later transmission in block mode: "Function Key Operation" and "Keypad Application Modes". These exceptions permit direct communication from keyboard to computer without affecting the display.

Function Key Operation works as follows:

a. Depressing the key selected as the lead-in character (ESC or ~, paragraph 2.2) puts the terminal in the function key mode.

b. Depression of any other character key then causes transmission of a four character sequence: Lead-in character, the ASCII code for the second character entered, the selected end-of-message character, and null.

c. If the lead-in character key is depressed in error, depressing it again cancels the function key mode.

This permits transmission of 128 separate function codes, corresponding to the 128 ASCII codes.

The second exception applies only when one of the **Keypad Application Modes** described in paragraph 4.6 is used. In this case, the sequence listed in table 4-1 is transmitted when one of the numeric keypad keys is depressed, without affecting the display.

3.2.5 Line Mode. When the terminal is in Block mode, it can be made to transmit a line at a time instead of a page or field by the ^{C}3 keystroke or by remote command. In this mode, the foreground data on the line the cursor is on will be transmitted when RETURN or ENTER is keyed. The cursor will move down to the next row and a rollup will occur if it was on the bottom row.

3.2.6 Monitor Mode. This mode is provided as a program debugging and system troubleshooting aid. It is entered by the $^{C}1$ keystroke. All received characters including control codes are displayed in this mode. Control codes display as a two character mnemonic as shown in Appendix A. Remote commands are displayed but not executed, except for carriage return which is displayed as ^{C}R and executed.

NOTE

Bank 2 switches 3 and 7 should be ON when Monitor mode is used (Auto New Line and Auto Line Feed). Type $^{C}2$ to return to Normal mode.

3.3 EMULATIONS

3.3.1 General. In addition to "Hazeltine", the terminal may be set up to emulate a Regent 25 or ADM-3A terminal as described in paragraph 2.2, with the limitations described below. These terminals do not make a distinction between foreground or background data, nor do they have block modes. All data is displayed in intensity in these emulations, and all "foreground/background" and block mode functions described in paragraph 3.1 do not apply. The keyboard operates like the terminal being emulated, rather than as described in paragraph 3.2, and the remote command set for the terminal being emulated applies (Appendix C) rather than those described in section IV, with the following exceptions:

- The keyboard controls described in paragraph 3.2.2 (except Line mode) apply to all.
- The three keypad application modes described in paragraph 4.6 apply to the Regent 25 emulation, and Modes 1 and 2 apply to the ADM-3A emulation.

3.3.2 Limitations. The following conditions and limitations apply to the various emulations:

Hazeltine —

- To properly emulate a Hazeltine 1500, ~ must be selected as lead-in character and Auto New Line must be enabled (paragraph 2.2).

ADM-3A —

- The Esprit II terminal neither generates nor responds to secondary channel signals.
- There is no automatic answer back feature.

Regent 25 —

- Store control character command (ESC Z) is not executed.
- Consul 580 compatible keyboard lock and unlock control codes are not available.
- Numeric pad acts as function keys by remote command only; not by hardware switch setting.
- No keyboard entries are processed when keyboard is locked out.
- There is no "CASE" key.
- When a "break" is transmitted no * will be displayed to show the interface is disconnected.
- In half duplex, no code is transmitted for the cursor arrow keys. The following keystrokes must be used to both transmit and perform cursor movement commands:

Up = ^{C}K	Right = ^{C}F
Down = LINE FEED	Left = ^{C}U

Section IV

REMOTE COMMANDS

4.1 INTRODUCTION

This section describes the Hazeltine remote command set. The emulation switch (paragraph 2.2) must be set for Hazeltine for these commands to apply. Refer to Appendix C for the remote command set for other emulations. The remote command repertoire of the Esprit II provides the user with the capability of controlling the terminal via the host computer software. For the terminal to execute a remote command, the command code must be preceded by a lead-in code (except as noted). The lead-in code may be either a tilde (ASCII ~, decimal 126, hexadecimal 7E) or an escape (ASCII ESC, decimal 27, hex 1B). The lead-in switch (paragraph 2.2) must be set to agree with the code selected. The lead-in code is not displayed when received and does not advance the cursor. The command code must follow the lead-in without intervening characters. If the code following the lead-in is not one of the valid command codes requiring a lead-in (a second lead-in is invalid), both the lead-in character and the character following it will be ignored. Some commands apply only in certain modes as noted herein.

4.2 CURSOR CONTROLS

Command	Lead-in	ASCII	Description
Cursor Home	Yes	DC2	The cursor moves to the upper left character (HOME) position. The display is unchanged.
or Up	Yes	FF	The cursor moves up one row in the same column without altering the display. If the cursor is on the top row, it does not move.
Cursor Down	Yes	VT	The cursor moves down one row in the same column without altering the display. If the cursor is on the bottom row, it does not move.
Cursor Left Backspace	No	BS	The cursor moves left one column in the same row without altering the display. If the cursor is in the leftmost column, it moves to the rightmost column and up one row unless it is on the HOME position.
Cursor Right	No	DLE	The cursor moves right one column in the same row without altering the display. If the cursor is in the rightmost column, it moves to the leftmost column of the next row unless it is on the bottom row.
Line Feed	No	LF	The cursor moves down one row in the same column; if it is in the bottom row, the display scrolls up. If the Auto LF/CR switch on the rear panel is set to Auto Line Feed (Paragraph 2.2), Line Feed command is ignored.

Command	Lead-in	ASCII	Description
Carriage Return	No	CR	The cursor moves to the leftmost column of the present row. If the Auto LF/CR is set to Auto LF (Paragraph 2.2), the cursor also moves down one row; if it is on the bottom row, the display scrolls up.
Field Tab	No	HT	The cursor tabs to the first character position in the next foreground field. If there is no new foreground down screen from the present cursor position the cursor remains in the original location. A warning alarm is heard in this condition.
Horizontal Tab	Yes	:	The cursor tabs to the next tab stop on the present row. Tab stops are located in columns 0, 8, 16, 24, ... (steps of 8) ..., 72 (numbering columns from 0 to 79). If there are no more tab stops in the present row the cursor moves to the leftmost column of the next row or to the home position if it was on the bottom row.
Reverse Field Tab	Yes	DC4	The cursor is repositioned to the first foreground position in the field in which it is located. In the event that the cursor is located in the first position of a foreground field or within a background field, the cursor will move back to the first position of the previous foreground field. This command will be ignored if the cursor is in the first position of the first foreground field on the display. A warning alarm is heard in this condition.
Direct Cursor Address	Yes	DC1,X,Y	The Direct Cursor Address command is a four character sequence: Lead-in, DC1, X-coordinate, Y-coordinate. The 80 character columns are designated X and range from 0 to 79. The rows are designated Y and range from 0 to 23. The four characters in the sequence must be received without intervening characters, such as NUL and DEL. Appendix B lists all possible addresses and the key strokes for generating them.
Send Cursor Address	Yes	ENQ	The terminal responds with the sequence X-Coordinate, Y-Coordinate, EOM sequence. The coordinate system is the same as described for Direct Cursor Address above. The coordinates transmitted are listed in appendix B.

Command	Lead-in	ASCII	Description
Send Character at Cursor Address	Yes	!	The terminal transmits the character at the present cursor position followed by the selected EOM code. The cursor is not advanced. When used in conjunction with the cursor up, down, right, left and direct cursor address commands, this permits reading any character previously entered on the display.

4.3 EDITING COMMANDS

Clear Screen	Yes	FS	The entire screen is cleared to foreground spaces and the cursor moves to the HOME position.
Clear to End of Screen (Foreground spaces)	Yes	CAN	All characters from and including the present cursor position to the end of the screen are cleared to foreground spaces.
Clear to End of Screen (Background spaces)	Yes	ETB	All characters from and including the present cursor position to the end of the screen are cleared to background spaces.
Clear to End of Line	Yes	SI	All characters from and including the present cursor position to the end of the cursor row are cleared to foreground spaces.
Clear Field	Yes	SYN	The terminal will cause the contents of the foreground field in which the cursor is currently positioned to be cleared. The cursor will be repositioned to the beginning of the field. Nothing will be cleared if the cursor is positioned within a background field, and the cursor will be repositioned to the first position of the next foreground field unless there is no new foreground field down screen.
Clear Foreground	Yes	GS	All foreground characters on the display are replaced with foreground spaces and the cursor moves to the first character position of the first foreground field.
Insert Line (Interactive mode only)	Yes	SUB	A new row of all foreground spaces is inserted at the present cursor position. The row the cursor was on, and all rows below it move down. The cursor is placed in the first column of the new row.
Delete Line (Interactive mode only)	Yes	DC3	The row the cursor is on is deleted from the display and all rows below it scroll up one row. The cursor moves to the first column of the present row.

Command	Lead-in	ASCII	Description
Insert Character (Block mode only)	Yes	P	This command alternately puts the terminal into and out of the insert mode. All characters received after the first occurrence of the command are inserted at the cursor location, with the characters at that location and to the right, to the end of field or end of line, whichever comes first, being moved to the right.
Delete Character (Block mode only)	Yes	T	The character at the cursor location is deleted and all characters to the right, to the end of field or end of line, are moved left one position.
Set Background	Yes	EM	All subsequent data is entered as a background field until cancelled by the following Set Foreground command. Data entered as background is displayed at low intensity, not cleared by a Clear Foreground Field command, and tabbed over by a Field Tab command. The terminal defaults to this state at turn-on.
Set Foreground	Yes	US	All subsequent data is entered as a foreground field until cancelled by the Set Background command; all foreground data is displayed at high intensity, underline, or reverse video as selected through the rear panel switches.

4.4 MODE AND TRANSMIT COMMANDS

Enter Block Mode	Yes	#	The terminal will enter the Block (editing) mode. Subsequent keyboard entries will be stored on the display without being transmitted until a Page, Line or Field transmission is initiated by keyboard or remote command.
Exit Block Mode	Yes	$	The terminal reverts to the Normal (Interactive) mode.
Set Line Mode (Block mode only)	Yes	(period)	Line transmit is defined as transmission of all foreground characters on the line on which the cursor is located. Transmission will be invoked by depressing the CR or ENTER key and terminated by insertion of the selected End of Message sequence. The cursor will be relocated to the first position of the next line. If the cursor is located on the bottom line, line transmit causes the screen to roll up.

Command	Lead-in	ASCII	Description
Remote Page Transmit	Yes	SO	All foreground data on the screen will be transmitted. The end of transmission is indicated by a selected End of Message sequence. After transmission is completed, the cursor is repositioned to the first character of the first foreground field on the display.
Remote Field Transmit	Yes	)	The data in the foreground field in which the cursor is currently positioned will be transmitted and the end of transmission is indicated by a selected End of Message sequence. The cursor will be repositioned to the beginning of the field. Nothing will be transmitted if the cursor is within a background field, and the cursor will be repositioned to the first position of the next foreground field, unless there is no new foreground field down screen.

4.5 AUXILIARY PORT COMMANDS

Remote Print	Yes	RS	All data from the home position to the cursor location is output at the auxiliary port with a carriage return and line feed (if auto line feed is not selected) or carriage return only (if auto line feed is selected) inserted after each line.

NOTE

Each of the three following commands takes effect **after receipt of the character which follows it.** A NUL or DEL should be transmitted after each of these commands for proper operation.

Enable Auxiliary Port With Display	Yes	/	All data received via the primary port is displayed, processed and output at the auxiliary port. In half duplex operation, keyboard entries are also transmitted via the auxiliary port. The terminal defaults to this condition at turn-on.
Enable Auxiliary Port Without Display	Yes	*	This command permits transmission to an auxiliary device without affecting the screen. On receipt of this command, data received via the primary port is output to the auxiliary port without processing or display by the terminal. When using this feature in half-duplex systems, it is recommended that data sent to the terminal be preceded by a keyboard lock-out (lead-in, CTRL U) and followed by

Command	Lead-in	ASCII	Description
			keyboard unlock (lead-in, CTRL F). This will prevent interruption of received data by transmission of the keyboard entry.
Disable Auxiliary Output	Yes	?	The auxiliary output is disabled and no data is output at the auxiliary port. Input remains enabled.

4.6 KEYBOARD AND MISCELLANEOUS COMMANDS

Sound Alarm	No	BEL	The terminal sounds an audible alarm for approximately 0.3 seconds.
Keyboard Unlock	Yes	ACK	The keyboard is unlocked. The terminal defaults to this condition at power-on.
Keyboard Lock	Yes	NAK	The keyboard is locked out and no operator entries may be made. This command may be cancelled by the Keyboard Unlock command.
Keypad Function Mode			The numeric keypad keys 0 through 9, period and comma (also – and ENTER for Mode 3) are converted to function keys. They transmit a sequence of two or three characters as listed in Table 4-1. In interactive mode, this capability may be used to permit the host computer to distinguish between numeric pad entries and entries made on the main alphanumeric keys. In **block mode,** it permits communication without transmission from the display as **these sequences are transmitted immediately without affecting the display** (unless echoed). Note that Mode 3 can be used in Block/Page mode only if the "Remote Transmit" commands are used; with the ENTER key converted to a function key, there is no way to transmit from the keyboard.
Mode 1	Yes	:	
Mode 2	Yes	<	
Mode 3	Yes	=	
Display Test Pattern "H"	Yes	"	A test pattern of all background "H" characters is displayed with the cursor in the HOME position.
Display ASCII Pattern	Yes	8	A pattern of all ASCII characters is displayed with the cursor in the HOME position.

Table 4-1. Numeric Cluster Function Key Modes

Key-stroke	Sequence Transmitted Mode 1	Mode 2	Mode 3
0	LI 0	STX 0 CR	LI ? p
1	LI 1	STX 1 CR	LI ? q
2	LI 2	STX 2 CR	LI ? r
3	LI 3	STX 3 CR	LI ? s
4	LI 4	STX 4 CR	LI ? t
5	LI 5	STX 5 CR	LI ? u
6	LI 6	STX 6 CR	LI ? v
7	LI 7	STX 7 CR	LI ? w
8	LI 8	STX 8 CR	LI ? x
9	LI 9	STX 9 CR	LI ? y
.	LI .	STX . CR	LI ? n
,	LI ,	STX , CR	LI ? l
-			LI ? m
ENTER			LI ? M

(The final character for Mode 3 is the normal key code plus 40 hex)
LI = The selected lead-in character (~ or ESC) for Hazeltine emulation, and ESC for other emulations.

4.7 TIMING CONSTRAINTS

For operation up to and including 9600 Baud, fill characters are generally not required after remote commands. However, if more than one of the time consuming commands listed below (those requiring the terminal to perform extensive reading and/or writing in display memory) are used together, some fill characters (NUL or DEL) may be required to prevent overrunning the terminal's input buffer.

The symptom of buffer overflow is the loss of 64 contigous characters (or a multiple of 64).

At 19,200 Baud only, the terminal will automatically transmit a DC3 character (X OFF) whenever its 64 character input buffer is approximately 90% full, and a DC1 character (X ON) when it drops to approximately 10%. If the host computer responds by suspending and resuming transmission, no timing constraints are placed on the programmer. Otherwise, fill characters (NUL or DEL) may be required (they are not placed on the input queue and do not fill the buffer) after the following commands:

- Clear Commands
- Field Tab or Reverse Field Tab
- Insert or Delete Line
- Insert Character(s)

Section V

INTERFACE

5.1 COMMUNICATIONS INTERFACE

5.1.1 ASCII Code. The ESI Esprit II terminal communicates via ASCII codes shown in Appendix A. A parity bit, as selected, is added to make an 8-bit code.

5.1.2 Asynchronous Data. The form for received and transmitted data is asynchronous serial ASCII. Each character is preceded by a start bit and separated from the following character by a minimum of 1 or 2 stop bits — depending on baud rate (refer to Section I). Received characters must have at least one stop bit.

The parity bit can be selected (refer to Section II) to be even, odd, always one, or always zero. If a character is received with incorrect parity (with odd or even parity selected), a question mark (?) is displayed on the screen at the cursor position. This indicates to the terminal operator that erroneous data was received. Switches are provided to select 1 of 15 transmission rates from 50 to 19,200 baud.

5.1.3 EIA Input/Output Connector. The standard EIA input/output connector located on the rear of the terminal (see figure 5-1) provides the connection to the appropriate data set or acoustic coupler. The signals conform to EIA Standard RS-232C. These are listed in table 5-1. If the current loop option is used, switches at the rear of the terminal (refer to Section II) must be set to select current loop operation.

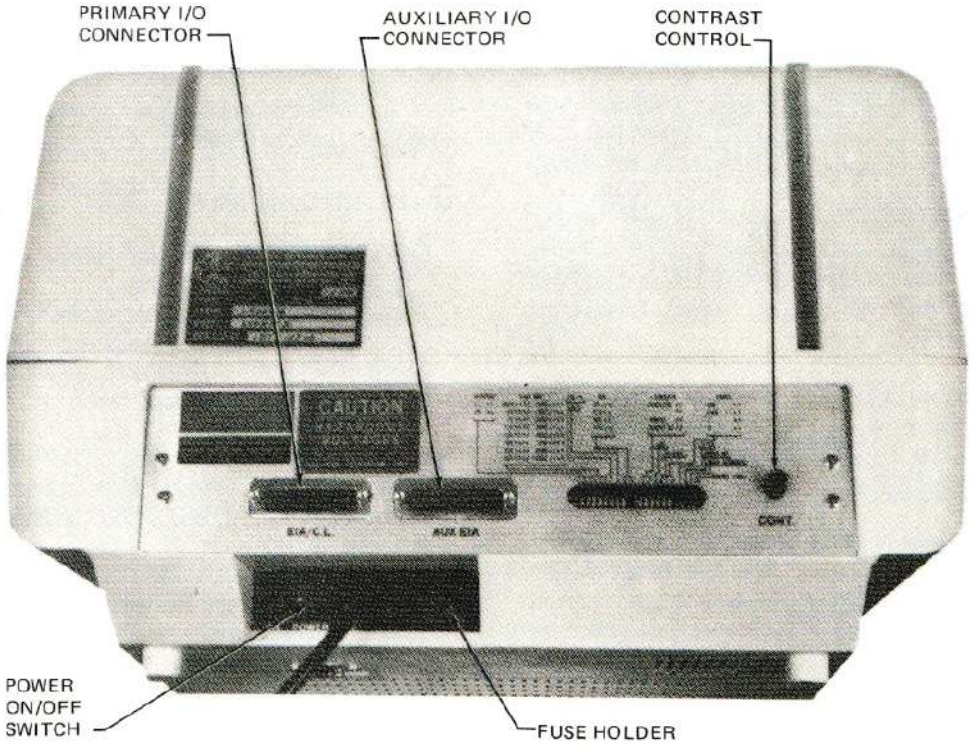


Figure 5-1. Rear of Terminal

Table 5-1. EIA Interface

Pin Number	Direction of Signal	EIA Designation	CCITT Designation	Function
1	—	AA	101	Protective Ground (Chassis)
2	From Terminal	BA	103	Transmitted Data
3	To Terminal	BB	104	Received Data
4	From Terminal	CA	105	Request to Send
5	To Terminal	CB	106	Clear to Send
6	To Terminal	CC	107	Data Set Ready
7	—	AB	102	Signal Ground
8	To Terminal	CF	109	Data Carrier Detect
13	From Terminal	—		16X Baud Rate Clock (TTL)
18	To Terminal	—		+ Current Loop Input
19	To Terminal	—		- Current Loop Input
20	From Terminal	CD*	108.2	Data Terminal Ready
21	From Terminal	—		+ Current Loop Output
25	From Terminal	—		- Current Loop Output

* CD is true (high) whenever terminal is on.

5.1.4 Auxiliary Input/Output Connector. The auxiliary input/output port permits serial output of received and transmitted data to an RS-232C compatible auxiliary device such as a printer, recorder, or another terminal. It also permits display and transmission of serial data input from an auxiliary device. Output and display may be controlled by remote commands described in Section IV.

The auxiliary input/output connector is located at the rear of the terminal (see figure 5-1). It provides the EIA RS-232C voltage level signals listed in table 5-2.

5.1.5 Current Loop Interface. The current loop interface converts the standard EIA RS-232 voltage level interface to a 20 mA current switching interface. The current loop interface switching states are "mark" (current flow) or "space" (no current flow). Figure 5-2 shows the external current loop configuration for either a four-wire (full duplex) facility or a two-wire (half duplex) facility.

The maximum ratings are:

Current:	30 mA maximum
Open Loop Voltage:	50 V maximum
Cable Interface:	1000 ft maximum 9600 baud

5.1.6 Hardwired Interface. The terminal can be connected directly to a computer by connecting pins 2, 3, and 7 from the EIA connector on the rear panel. Note that pins 2 and 3 may have to be crossed with the corresponding pins on the computer. No wiring changes are required at the terminal to simulate the presence of a modem. Refer to your computer supplier for any special wiring at the computer interface.

Table 5-2. Auxiliary Interface

Pin Number	Direction of Signal	Desig-nation	Function
1	—	AA	Protective Ground (Chassis)
2	To Terminal	Aux BB	Auxiliary Data in
3	From Terminal	Aux BA	Auxiliary Data Out
4	To Terminal	Aux CA	Auxiliary Request to Send
5	From Terminal	Aux CB	Clear to Send
6	From Terminal	Aux CC	See Note
7	—	AB	Signal Ground
8	From Terminal	Aux CF	See Note

NOTE

Aux CC is true (high) whenever terminal is on. Aux CF is true when primary CF is true.

5.1.7 Interactive Full Duplex Operation. The full duplex mode of communication is used for interactive communication in systems capable of simultaneous two-way transmission. In interactive mode with echo, it permits more computer control of the display. Data and commands entered at the keyboard are transmitted directly to the computer without display. The display is affected only by data received by or "echoed" back to the terminal. In the interactive full duplex mode, the terminal's "Request to Send" output is high (true) when the first character is entered and remains high until power is shut off or the terminal is switched to half duplex.

5.1.8 Half Duplex Operation. The half duplex mode of communication is used when the system is not capable of simultaneous two-way transmission, or when "echoed" back operation is undersirable. Data from the keyboard is displayed immediately. Half duplex transmission via a modem is accomplished by the following modem control sequence:

a. When the terminal has data to transmit (when a key is depressed in interactive mode, or when ENTER is entered in batch modes) the

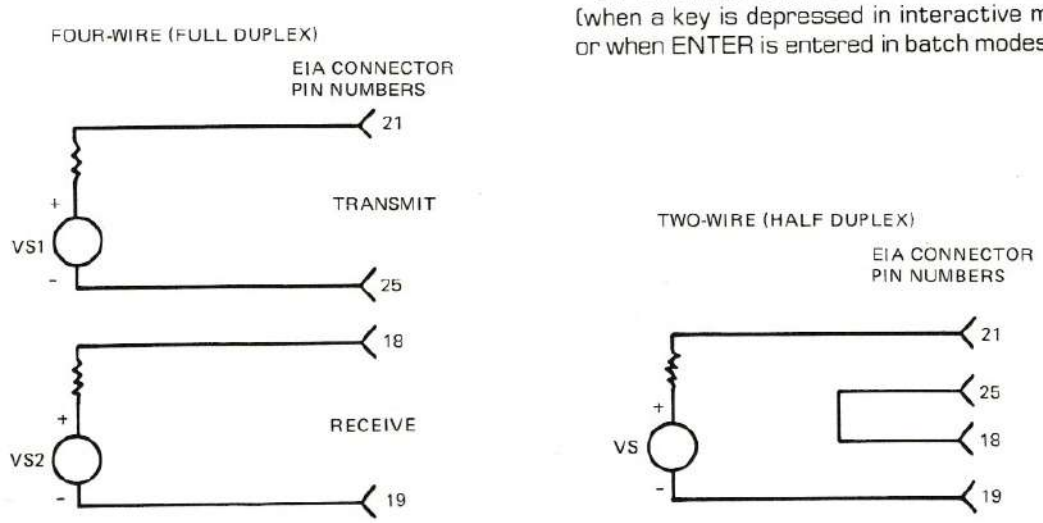


Figure 5-2. Current Loop Interface

terminal outputs a "Request to Send" signal to the modem.

b. The terminal checks for a "Data Set Ready" signal from the modem.

c. Upon sensing the "Data Set Ready" signal, the terminal waits, if necessary, for a "Clear to Send" signal from the modem.

d. Upon sensing the "Clear to Send" signal, the terminal transmits the data via the modem. The terminal's "Request to Send" signal remains present, and entered characters are transmitted until the selected End of Message character is sent.

e. After transmission of the End of iMessage or "turn around" character, the terminal resets its Request to Send signal and the modem switches to the receive mode.

Note that if the terminal does not sense a "Data Set Ready" signal in step b above, it transmits the data regardless of the presence or absence of the "Clear to Send" signal. This permits direct hard-wired connection to a computer or other device without simulation of modem control signals.

5.1.9 Block Mode Operation. Either a full or half duplex communication channel may be used for Block mode (line, page or field) operation; however, batch transmissions should not be echoed. The terminal will follow the half duplex modem control sequence described in paragraph 5.1.8 for all batch transmissions.

5.2 DATA SETS

5.2.1 103A or 212A Type Modems. The terminal connects directly to a 103A or 212A modem through an interface cable which is available from ESI.

5.2.2 202 Type Modem. The terminal connects to a 202 modem through an interface cable which is available from ESI The following procedure should be followed for proper operation with a half duplex 202 modem.

a. After the first key is depressed, the terminal conditions the modem for transmission. This can take up to 1/5 of a second. A very fast typist should take care to ensure that the first character reaches the screen before additional entries are made.

b. To complete the transaction to the computer system, either a CR (RETURN), ETX (CTRL C), or EOT (CTRL D) must be entered as a termination character. The termination character used is determined by the computer software. Upon sending the termination character, the 202 modem switches into the receive mode.

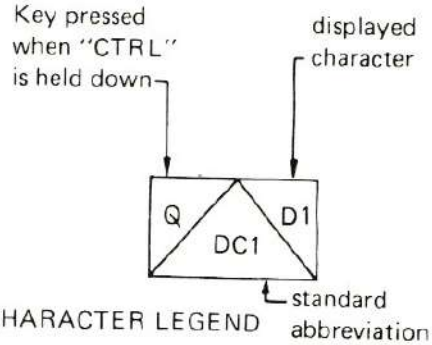
c. Depressing the next character for transmission returns operation to step a.

APPENDIX A

ASCII CODE

ROW	BIT 4 3 2 1	COL 0 (BIT 7 6 5 = 000)	1 (001)	2 (010)	3 (011)	4 (100)	5 (101)	6 (110)	7 (111)
0	0000	@ / N U / NUL	P / D L / DLE	SP	0	@	P	`	P
1	0001	A / S H / SOH	Q / D I / DCI	!	1	A	Q	a	q
2	0010	B / S X / STX	R / D2 / DC2	"	2	B	R	b	r
3	0011	C / E X / ETX	S / D3 / DC3	#	3	C	S	c	s
4	0100	D / E T / EOT	T / D4 / DC4	S	4	D	T	d	t
5	0101	E / E Q / ENQ	U / N K / NAK	%	5	E	U	e	u
6	0110	F / A K / ACK	V / S Y / SYN	&	6	F	V	f	v
7	0111	G / B L / BEL	W / E B / ETB	'	7	G	W	g	w
8	1000	H / B S / BS	X / C N / CAN	(	8	H	X	h	x
9	1001	I / H T / HT	Y / E M / EM	)	9	I	Y	i	y
A	1010	J / L F / LF	Z / S B / SUB	*	:	J	Z	j	z
B	1011	K / V T / VT	[/ E C / ESC	+	;	K	[	k	{
C	1100	L / F F / FF	\ / F S / FS	,	<	L	\	l	|
D	1101	M / C R / CR	] / G S / GS	-	=	M	]	m	}
E	1110	N / S O / SO	^ / R S / RS	.	>	N	^	n	~
F	1111	O / S I / SI	- / U S / US	/	?	O	_	o	DEL

AK –ACKNOWLEDGE
BL –BELL
BS –BACKSPACE
CN –CANCEL LINE
CR –CARRIAGE RETURN
DL –DATA LINK ESCAPE
D1 –DEVICE CONTROL 1
D2 –DEVICE CONTROL 2
D3 –DEVICE CONTROL 3
D4 –DEVICE CONTROL 4
EM –END OF MEDIUM
EQ –ENQUIRY
EX –END OF TRANSMISSION
ES –ESCAPE
EB –END OF BLOCK
ET –END OF TEXT
FF –FORM FEED
FS –FILE SEPARATOR
GS –GROUP SEPARATOR
HT –HORIZONTAL TAB
LF –LINE FEED
NK –NEGATIVE ACKNOWLEDGE
RS –RECORD SEPARATOR
S1 –SHIFT IN
SO –SHIFT OUT
SP –SPACE
SH –START OF HEADING
ST –START OF TEXT
SB –SUBSTITUTE
SY –SYNCHRONOUS IDLE
US –UNIT SEPARATOR
VT –VERTICAL TAB



CONTROL CHARACTER LEGEND

APPENDIX B

CURSOR ADDRESS TABLES

HAZELTINE Direct Cursor Address and Send Cursor Address

DECIMAL CODE	KEYSTROKE	CRT POSITION ROW #	CRT POSITION COLUMN #
0	CTRL @	0	0
1	CTRL A	1	1
2	CTRL B	2	2
3	CTRL C	3	3
4	CTRL D	4	4
5	CTRL E	5	5
6	CTRL F	6	6
7	CTRL G	7	7
8	CTRL H	8	8
9	CTRL I	9	9
10	CTRL J	10	10
11	CTRL K	11	11
12	CTRL L	12	12
13	CTRL M	13	13
14	CTRL N	14	14
15	CTRL O	15	15
16	CTRL P	16	16
17	CTRL Q	17	17
18	CTRL R	18	18
19	CTRL S	19	19
20	CTRL T	20	20
21	CTRL U	21	21
22	CTRL V	22	22
23	CTRL W	23	23
24	CTRL X	23	24
25	CTRL Y	23	25
26	CTRL Z	23	26
27	CTRL [	23	27
28	CTRL \	23	28
29	CTRL]	23	29
30	CTRL ^	23	30
31	CTRL _	23	31
32	SPACE	0	32
33	!	1	33
34	"	3	34
35	#	4	35
36	$	5	36
37	%	6	37
38	&	7	38
39	'	8	39
40	(	9	40
41	)	10	41
42	*	11	42
43	+	12	43
44	,	13	44
45	-	14	45
46	.	15	46
47	/	16	47
48	0	17	48
49	1	18	49
50	2	19	50
51	3	20	51
52	4	21	52
53	5	22	53
54	6	23	54
55	7		55
56	8		56
57	9		57
58	:		58
59	;		59
60	<		60
61	=		61
62	>		62
63	?		63

DECIMAL CODE	KEYSTROKE	CRT POSITION ROW #	CRT POSITION COLUMN #
64	@	0	64
65	A	1	65
66	B	2	66
67	C	3	67
68	D	4	68
69	E	5	69
70	F	6	70
71	G	7	71
72	H	8	72
73	I	9	73
74	J	10	74
75	K	11	75
76	L	12	76
77	M	13	77
78	N	14	78
79	O	15	79
80	P	16	79
81	Q	17	79
82	R	18	79
83	S	19	79
84	T	20	79
85	U	21	79
86	V	22	79
87	W	23	79
88	X	23	79
89	Y	23	79
90	Z	23	79
91	[	23	79
92	\	23	79
93	]	23	79
94	^	23	79
95	_	23	79
96	`	0	0
97	a	1	1
98	b	2	2
99	c	3	3
100	d	4	4
101	e	5	5
102	f	6	6
103	g	7	7
104	h	8	8
105	i	9	9
106	j	10	10
107	k	11	11
108	l	12	12
109	m	13	13
110	n	14	14
111	o	15	15
112	p	16	16
113	q	17	17
114	r	18	18
115	s	19	19
116	t	20	20
117	u	21	21
118	v	22	22
119	w	23	23
120	x	23	24
121	y	23	25
122	z	23	26
123	{	23	27
124	|	23	28
125	}	23	29
126	~	23	30
127	DEL	23	31

NOTE: The coordinates of "Send Cursor Address" command are shown in the outlined areas.

ADM-3A Direct Cursor Address Table

DECIMAL CODE	KEYSTROKE	CRT POSITION ROW #	CRT POSITION COLUMN #
0	CTRL @		
1	CTRL A	1	33
2	CTRL B	2	34
3	CTRL C	3	35
4	CTRL D	4	36
5	CTRL E	5	37
6	CTRL F	6	38
7	CTRL G	7	39
8	CTRL H	8	40
9	CTRL I	9	41
10	CTRL J	10	42
11	CTRL K	11	43
12	CTRL L	12	44
13	CTRL M	13	45
14	CTRL N	14	46
15	CTRL O	15	47
16	CTRL P	16	48
17	CTRL Q	17	49
18	CTRL R	18	50
19	CTRL S	19	51
20	CTRL T	20	52
21	CTRL U	21	53
22	CTRL V	22	54
23	CTRL W	23	55
24	CTRL X		56
25	CTRL Y		57
26	CTRL Z		58
27	CTRL [		59
28	CTRL \		60
29	CTRL]		61
30	CTRL ^		62
31	CTRL _		63
32	SPACE	0	0
33	!	1	1
34	"	2	2
35	#	3	3
36	$	4	4
37	%	5	5
38	&	6	6
39	'	7	7
40	(	8	8
41	)	9	9
42	*	10	10
43	+	11	11
44	,	12	12
45	-	13	13
46	.	14	14
47	/	15	15
48	0	16	16
49	1	17	17
50	2	18	18
51	3	19	19
52	4	20	20
53	5	21	21
54	6	22	22
55	7	23	23
56	8		24
57	9		25
58	:		26
59	;		27
60	<		28
61	=		29
62	>		30
63	?		31

DECIMAL CODE	KEYSTROKE	CRT POSITION ROW #	CRT POSITION COLUMN #
64	@	0	32
65	A	1	33
66	B	2	34
67	C	3	35
68	D	4	36
69	E	5	37
70	F	6	38
71	G	7	39
72	H	8	40
73	I	9	41
74	J	10	42
75	K	11	43
76	L	12	44
77	M	13	45
78	N	14	46
79	O	15	47
80	P	16	48
81	Q	17	49
82	R	18	50
83	S	19	51
84	T	20	52
85	U	21	53
86	V	22	54
87	W	23	55
88	X		56
89	Y		57
90	Z		58
91	[		59
92	\		60
93	]		61
94	^		62
95	_		63
96	`	0	64
97	a	1	65
98	b	2	66
99	c	3	67
100	d	4	68
101	e	5	69
102	f	6	70
103	g	7	71
104	h	8	72
105	i	9	73
106	j	10	74
107	k	11	75
108	l	12	76
109	m	13	77
110	n	14	78
111	o	15	79
112	p	16	
113	q	17	
114	r	18	
115	s	19	
116	t	20	
117	u	21	
118	v	22	
119	w	23	
120	x		
121	y		
122	z		
123	{		
124	:		
125	}		
126	~		
127	DEL		

REGENT 25 Direct Cursor Address Table

DECIMAL CODE	KEYSTROKE	CRT POSITION ROW #	CRT POSITION COLUMN #
0	CTRL @		
1	CTRL A		
2	CTRL B		
3	CTRL C		
4	CTRL D		
5	CTRL E		
6	CTRL F		
7	CTRL G		
8	CTRL H		
9	CTRL I		
10	CTRL J		
11	CTRL K		
12	CTRL L		
13	CTRL M		
14	CTRL N		
15	CTRL O		
16	CTRL P		
17	CTRL Q		
18	CTRL R		
19	CTRL S		
20	CTRL T		
21	CTRL U		
22	CRTL V		
23	CTRL W		
24	CTRL X		
25	CTRL Y		
26	CTRL Z		
27	CTRL [		
28	CTRL \		
29	CTRL]		
30	CTRL ^		
31	CTRL –		
32	SPACE	0	0
33	!	1	1
34	"	2	2
35	#	3	3
36	$	4	4
37	%	5	5
38	&	6	6
39	'	7	7
40	(	8	8
41	)	9	9
42	*	10	10
43	+	11	11
44	,	12	12
45	—	13	13
46	.	14	14
47	/	15	15
48	0	16	16
49	1	17	17
50	2	18	18
51	3	19	19
52	4	20	20
53	5	21	21
54	6	22	22
55	7	23	23
56	8		24
57	9		25
58	:		26
59	;		27
60	<		28
61	=		29
62	>		30
63	?		31

DECIMAL CODE	KEYSTROKE	CRT POSITION ROW #	CRT POSITION COLUMN #
64	@		32
65	A		33
66	B		34
67	C		35
68	D		36
69	E		37
70	F		38
71	G		39
72	H		40
73	I		41
74	J		42
75	K		43
76	L		44
77	M		45
78	N		46
79	O		47
80	P		48
81	Q		49
82	R		50
83	S		51
84	T		52
85	U		53
86	V		54
87	W		55
88	X		56
89	Y		57
90	Z		58
91	[		59
92	\		60
93	]		61
94	^		62
95	_		63
96	`		64
97	a		65
98	b		66
99	c		67
100	d		68
101	e		69
102	f		70
103	g		71
104	h		72
105	i		73
106	j		74
107	k		75
108	l		76
109	m		77
110	n		78
111	o		79
112	p		
113	q		
114	r		
115	s		
116	t		
117	u		
118	v		
119	w		
120	x		
121	y		
122	z		
123	{		
124	:		
125	}		
126	~		
127	DEL		

REGENT 25 Horizontal and Vertical Address Table

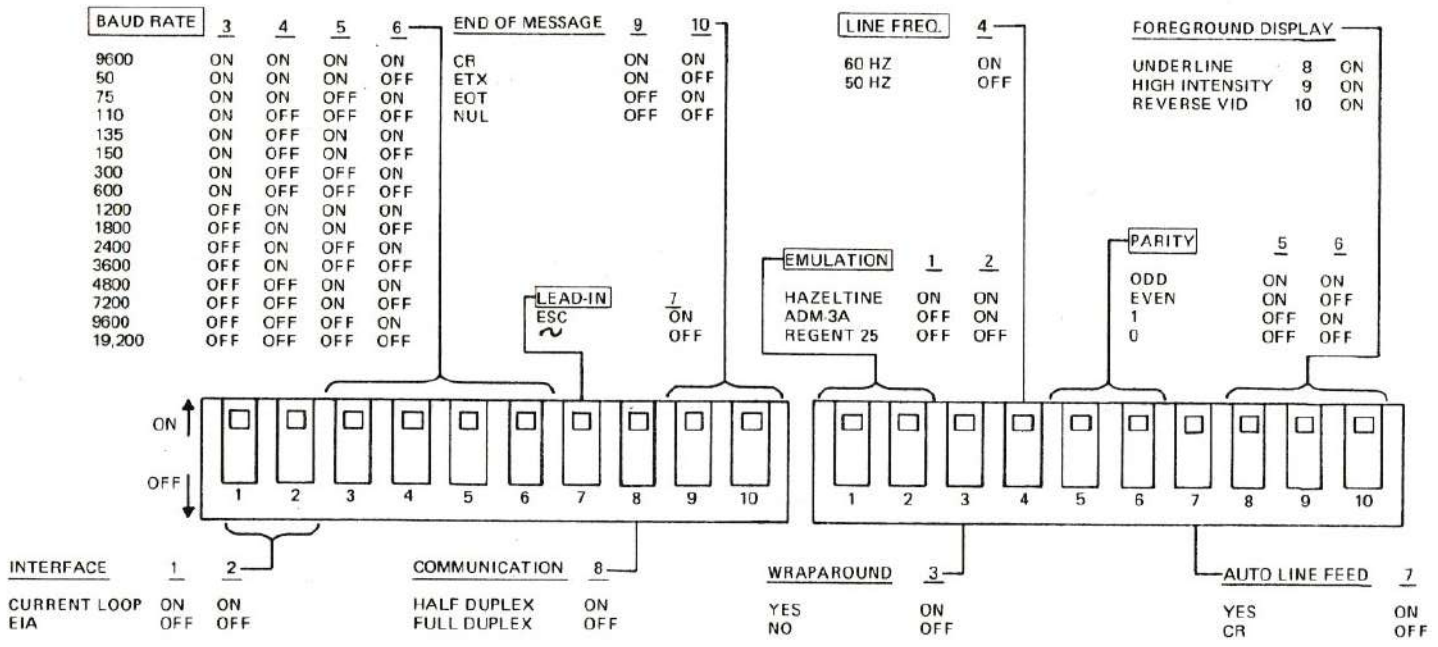
DECIMAL CODE	KEYSTROKE	CRT POSITION ROW #	CRT POSITION COLUMN #
0	CTRL @	0	0
1	CTRL A	1	1
2	CTRL B	2	2
3	CTRL C	3	3
4	CTRL D	4	4
5	CTRL E	5	5
6	CTRL F	6	6
7	CTRL G	7	7
8	CTRL H	8	8
9	CTRL I	9	9
10	CTRL J	10	
11	CTRL K	11	
12	CTRL L	12	
13	CTRL M	13	
14	CTRL N	14	
15	CTRL O	15	
16	CTRL P	16	10
17	CTRL Q	17	11
18	CTRL R	18	12
19	CTRL S	19	13
20	CTRL T	20	14
21	CTRL U	21	15
22	CTRL V	22	16
23	CTRL W	23	17
24	CTRL X		18
25	CTRL Y		19
26	CTRL Z		
27	CTRL [		
28	CTRL \		
29	CTRL]		
30	CTRL ^		
31	CTRL _		
32	SPACE	0	20
33	!	1	21
34	"	2	22
35	#	3	23
36	$	4	24
37	%	5	25
88	&	6	26
39	'	7	27
40	(	8	28
41	)	9	29
42	*	10	
43	+	11	
44	,	12	
45	-	13	
46	.	14	
47	/	15	
48	0	16	30
49	1	17	31
50	2	18	32
51	3	19	33
52	4	20	34
53	5	21	35
54	6	22	36
55	7	23	37
56	8		38
57	9		39
58	:		
59	;		
60	<		
61	=		
62	>		
63	?		

DECIMAL CODE	KEYSTROKE	CRT POSITION ROW #	CRT POSITION COLUMN #
64	@	0	40
65	A	1	41
66	B	2	42
67	C	3	43
68	D	4	44
69	E	5	45
70	F	6	46
71	G	7	47
72	H	8	48
73	I	9	49
74	J	10	
75	K	11	
76	L	12	
77	M	13	
78	N	14	
79	O	15	
80	P	16	50
81	Q	17	51
82	R	18	52
83	S	19	53
84	T	20	54
85	U	21	55
86	V	22	56
87	W	23	57
88	X		58
89	Y		59
90	Z		
91	[		
92	\		
93	]		
94	^		
95	_		
96	`	0	60
97	a	1	61
98	b	2	62
99	c	3	63
100	d	4	64
101	e	5	65
102	f	6	66
103	g	7	67
104	h	8	68
105	i	9	69
106	j	10	
107	k	11	
108	l	12	
109	m	13	
110	n	14	
111	o	15	
112	p	16	70
113	q	17	71
114	r	18	72
115	s	19	73
116	t	20	74
117	u	21	75
118	v	22	76
119	w	23	77
120	x		78
121	y		79
122	z		
123	{		
124	:		
125	}		
126	~		
127	DEL		

Command	Hazeltine			Regent 25			ADM-3A		
	Lead In?	ASCII	Key-stroke	Lead In?	ASCII	Key-stroke	Lead In?	ASCII	Key-stroke
Direct Cursor Address	Yes	DC1	^Q	Yes	Y	Y	—	—	—
Send Cursor Address	Yes	ENQ	^E	—	—	—	—	—	—
Horizontal Address	—	—	—	No	DLE	^P	—	—	—
Vertical Address	—	—	—	No	VT	^K	—	—	—
Cursor Up	Yes	FF	^L	No	SUB	^Z	No	VT	^K
Cursor Down	Yes	VT	^K	—	—	—	—	—	—
Cursor Right	No	DLE	^P	No	ACK	^F	No	FF	^L
Cursor Left	No	BS	^H	No	NAK	^U	No	BS	^H
Cursor Home	Yes	DC2	^R	No	SOH	^A	No	RS	^^
Carriage Return	No	CR	^M	No	CR	^M	No	CR	^M
Line Feed	No	LF	^J	No	LF	^J	No	LF	^J
Field Tab	No	HT	^I	—	—	—	—	—	—
Reverse Field Tab	Yes	DC4	^T	—	—	—	—	—	—
Horizontal Tab	Yes	:	Colon	—	—	—	—	—	—
Enter Block Mode	Yes	#	#	—	—	—	—	—	—
Enter Line Mode	Yes	.	Period	—	—	—	—	—	—
Enter Normal Mode	Yes	$	$	—	—	—	—	—	—
Function Keypad Mode 1	Yes	;	Semi-colon	Yes	;	Semi-colon	Yes	;	Semi-colon
Function Keypad Mode 2	Yes	<	<	Yes	<	<	Yes	<	<
Function Keypad Mode 3	Yes	=	=	Yes	=	=	—	—	—
Exit Function Keypad Mode	Yes	>	>	Yes	>	>	Yes	>	>
Foreground Follows	Yes	US	^(under-line)	—	—	—	—	—	—
Background Follows	Yes	EM	^Y	—	—	—	—	—	—
Clear Field	Yes	SYN	^V	—	—	—	—	—	—
—									
Clear to End of Line	Yes	SI	^O	Yes	K	K	—	—	—
Clear to End of Screen (Foreground)	Yes	CAN	^X	—	—	—	—	—	—

Command	Hazeltine			Regent 25			ADM-3A		
	Lead In?	ASCII	Key-stroke	Lead In?	ASCII	Key-stroke	Lead In?	ASCII	Key-stroke
Clear to End of Screen (Background)	Yes	ETB	^W	Yes	k	k	—	—	—
Clear Foreground	Yes	GS	^]	—	—	—	—	—	—
Clear Screen	Yes	FS	^\	No	FF	^L	No	SUB	^Z
Insert Line	Yes	SUB	^Z	—	—	—	—	—	—
Delete Line	Yes	DC3	^S	—	—	—	—	—	—
Insert Character	Yes	P	^P	—	—	—	—	—	—
Delete Character	Yes	T	^T	—	—	—	—	—	—
Page Transmit	Yes	SO	^N	—	—	—	—	—	—
Field Transmit	Yes	)	)	—	—	—	—	—	—
Transmit Character at Cursor	Yes	!	!	—	—	—	—	—	—
Enable Aux Out With Display	Yes	/	/	No	DC2	^R	—	—	—
Enable Aux Out/ No Display	Yes	*	*	Yes	3	3	—	—	—
Disable Aux Out	Yes	?	?	No	DC4	^T	—	—	—
Local Print	Yes	RS	^^6	—	—	—	—	—	—
Transparent Print Off	—	—	—	Yes	4	4	—	—	—
Keyboard Lock	Yes	NAK	^U	Yes	5	5	No	SI	^O
Keyboard Unlock	Yes	ACK	^F	Yes	6	6	No	SO	^N
Sound Alarm	No	BEL	^G	No	BEL	^G	No	BEL	^G
Display Test Pattern (H)	Yes	"	"	—	—	—	—	—	—
Display Character Font	Yes	8	8	—	—	—	—	—	—

Lead In may be ESC or ~ for Hazeltine, must be ESC for Regent 25 or ADM-3A.



DEPRESS SHIFT/BREAK IF ANY OUTLINED SELECTION IS CHANGED WITH POWER ON

Esprit
Systems, Inc.

100 MARCUS DRIVE
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